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ABSTRACT

Empire State College educational evaluation is oriented to the individual student and in the learning experiences mediated by the institutional arrangements it is essential that cost information be on an individual student basis. Therefore the basic unit of analysis chosen is the individual student contract. The costing model developed assigns to each student contract its share of all costs -- both direct and indirect. Most elements of cost are gathered in cost centers by the commonly accepted definitions. A hypothesis that "high-impact" students would be more costly because they made greater use of tutors and engaged in a longer contract experience was correct. However, the high-impact students at one location, while taking work that lasted almost one month longer than those at another location, used substantially less tutor services than did those at the other location. An analysis of high-impact students' contracts and their relation to actual facility and cost was made. As is found with everything that develops from this cost/effectiveness system, however, more questions are raised than answered. (Author/KE)

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COST ANALYSIS FOR CONTRACT LEARNING

by

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Cost Analysis For Contract Learning

Introduction

Legislators, directors, trustees, managers, accountants -- actually all of us -- have known for most of our working lives that the person or persons who control the "purse strings" or make the rules about how we will use that which is in the "purse" control the destiny of our organizations, including educational institutions. We have allowed people, both in and out of our respective institutions, to impose upon us restrictive rules of use -- generally in the name of better budgeting or accountability -- that have stifled the basic purposes of our organizations. The "take over" action usually begins with the best of intentions: we have to know; there must be uniformity of cost data before we can handle the tougher and more elusive problems of educational evaluation. The latter attitude was put forcefully by Les Foreman of SDL[1] at an Educational Management Seminar sponsored by SDL in June 1974 when he said "We are suspicious of those who are working on evaluation prior to building a solid cost system."

Unfortunately, most attempts at management information systems have used the approach of developing the cost accounting system before putting emphasis upon the development of means to determine the effectiveness of programs in meeting individual, institutional and societal needs. This is done even though an essential principle of an effective management information system is that it provide data sufficiently comprehensive to enable informed decisions designed to continue and improve the institution -- not in only knowing where the funds have gone, but rather where they should go to further the educational goals.

Aware that many projects have been started over the years with the purpose of developing effective systems of management information and that most, if not all,

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[1]Systems Research Group, SDL, Toronto, Ontario, Canada developers of CAMPUS.

have been sidetracked by placing the initial emphasis on uniform accounting data. The Research Staff of Empire State College chose to put the "horse before the cart." Therefore, before any real effort was put into a cost analysis component the staff focused attention on determining the purposes to be served by the system developed in making possible more informed decisions in furthering the purposes for which Empire State College was founded.

Background on ESC

Empire State College was established within the State University of New York as SUNY's effort to "discover whether alternative approaches to higher education can more flexibly serve the needs of individual students, while maintaining quality and educational effectiveness comparable to that available to a student at a traditional campus."[1]

This charge has resulted in the development and utilization of a wide variety of educational delivery systems[2] at numerous locations throughout the State of New York. Individual degree programs based upon the student's expressed goals are developed with emphasis given to prior learning experiences, rather than prescribing specific programs of study within each degree area or major field.

The learning program, tailored to the needs and capacities of the student, is then broken down into educational plans which constitute academic contracts between the student and the College. Each contract will require its own learning activities and resources and contracts will vary in length from one month to six months. (Month equates to four forty hour weeks and converts to four semester hours of credit.)

Initial thinking by the Research Staff indicated that the cost/effectiveness program had to meet the following requirements:

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[1]Empire State College Bulletin, 1973-74, page 3.
[2]Delivery system is a convenience term selected to cover the variety of learning experiences such as field work, formal classes, formal independent study programs, work experience, tutorials, seminars, workshops, etc.

1. Evaluation of the educational effectiveness of the individual student program and overall program of study.
2. Evaluation of the alternative delivery systems employed.
3. Evaluation of the educational effectiveness of learning centers and learning units.
4. Provide for the variability of nontraditional programs.
5. Be compatible with data gathering and reporting techniques of the traditional institutions.
6. Provide that institutions without computer capability be able to implement the model without excessive cost.
7. Provide measurement of the "value added" contribution of the College program.
8. All costs associated with the general operation of the institution be considered and allocated to the units of measure.
9. That no cost figures be made available without linkage to educational effectiveness data.
10. The models developed must provide:
    a. an internal academic management tool which provides effectiveness information related to students, programs, centers, units and delivery systems as the basis for sound judgments;
    b. an internal administrative management tool which will enable comparison with other operations within the institution;
    c. detailed information for budget preparation and presentation;
    d. an external administrative and academic tool which will enable comparison of Empire State programs with similar programs elsewhere; and,

e. the technique and tools to enable the forecasting of the effects of changes in enrollment, character of enrollee, program, delivery systems and overhead.

A review of existing programs of effectiveness, cost, and cost effectiveness was made. Nowhere were we able to locate programs which contained extensive effort to measure educational effectiveness with a linkage to cost analysis that would fit the requirements set for ourselves.[1] The natural result was that ESC had to develop its own model.

Other papers presented at this session will explore the educational evaluation aspects of the program developed as well as data use. This paper will direct itself to the costing aspect of the entire program.

Basis of the Cost System

The development of the educational evaluation program set the parameters for the cost analysis component. As ESC educational evaluation is oriented to the individual student and the learning experiences mediated by the institutional arrangements it is essential that cost information be on an individual student basis. Therefore the basic unit of analysis chosen is the individual student contract.

The costing model[2] developed assigns to each student contract its share of all costs -- both direct and indirect. Most elements of cost are gathered in cost centers by the commonly accepted definitions. However, there are four elements of cost which differ significantly from existing costs models.

1. The ESC model requires assigning a value for all in-kind contributions of services, materials, facilities, and programs of others.
2. Developmental and access costs are treated on a deferred asset basis rather than charged in the year paid.

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[1] A paper directing itself to this effort was prepared in May, 1974, and is available upon request.

[2] Appendix A.

3. Appropriate portions of faculty salaries devoted to general institutional administration are assigned as general overhead rather than as a direct instructional cost.

4. Institution-wide average salary figures are used as the basis of contract assignment rather than actual salaries.

In addition the ESC model will take into consideration student's forgone earnings, additional costs incurred due to transportation, baby-sitters, etc., and the contribution made to society because of the ESC experience. These latter items are not presently refined but are being worked on for future inclusion.

The contract costing tool is designed with indexing sufficient to enable accumulation of costs by the more familiar reporting systems such as FTE, degree program, credit hour, etc., but -- more importantly -- provides cost data accumulations related to such matters as individual students, delivery systems, student characteristics, length of learning experience, and location of experience.

The viability inherent in the cost data will enable decision makers to assess an almost unlimited range of things such as:

-- Does a program of learning prove equally as effective in each geographic location at what cost variations?

-- Are educational outcomes equally effective when students employ mentor/student; mentor-tutor/student; coordinator/student; coordinator-tutor/student relationships at what cost variations?

-- Are there cost variations due to program of learning, prior experience, learning modes utilized, personal relationships, geographic location, etc.?

An Example

In late Spring, 1974, the ESC Research Staff decided to implement a pilot project of the larger cost/effectiveness study in order to:

a. test research strategies and techniques of data collection;

b. determine the availability of data from various college offices, learning centers and learning units;

c. provide some preliminary data on a sample of recent graduates concerning their learning experiences;

d. determine the annual student experience cost, the individual contract costs, and the differential costs of these graduate's learning experiences; and,

e. estimate the costs -- including staff manpower -- of conducting this kind of study.

The educational evaluation data was collected from a sample of 50 recent graduates, 30 from the type "A" locations and 20 from type "B" locations. Three areas of study were chosen. They were Business (17), Community and Social Services (16) and The Arts (17).

Cost data was necessarily collected for the entire College and assigned to tne appropriate contracts. However, the pilot project costing did not consider developmental and access costs on a deferred asset basis, the effect of outside funding, expenditures made by SUNY Central on behalf of ESC, nor in-kind contributions.

A full analysis of all of the different types of data collected is now under way. However, we are in a position to focus on the results of the graduate self-ratings in order to show the program evaluation -- cost linkage and indicate the broad possibilities within the cost/effectiveness model developed.

We must emphasize that data reported herein are preliminary, directed to only one aspect among many and do not include all elements of the cost model. <u>They must not, therefore, be construed as definitive nor complete</u>.

Forty-one of the pilot study graduates completed the rating forms in detail sufficient to enable the preparation of tables indicating Aggregate Outcome Change, Graduate Self-Rating Impacts by Learning Facility, and Graduate Self-Rating Impacts by Degree Program Areas, all linked to average cost.[1]

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[1]Average cost as used herein is not the more common average <u>annual</u> cost, but is the average cost for the length of the student programs.

Table 1[1] presents the mean change data for all graduates in the study grouped into high, medium, and low impact. The average experience cost for the graduates in these three groups is included.

Table 1

Aggregate Outcome Change on the Graduate

Self-Rating Scales Related to Average Experience Cost

Aggregate Mean Change	N	%	Average Experience Cost
High (3 + points)	10	(24)	$1,434.96
Medium (1.3 - 2.9 points)	21	(52)	1,152.67
Low (0.1 - 1.2 points)	10	(24)	1,129.38
Total	41	(100)	1,215.84

Table 2 shows the graduate's self-ratings in the high, medium and low outcome change categories by type of learning facility linked to average experience costs.

Table 2

Graduate Self-Rating Impacts By

Type of Learning Facility and Average Experience Cost

Type of Learning Facility	High Impacts			Medium Impact			Low Impact			Totals		
	%	N	Avg. Cost	%	N	Avg. Cost	%	N	Avg. Cost	%	N	Avg. Cost
A	25	(6)	$1448.51	50	(12)	$1138.74	25	(6)	$1046.72	100	(24)	$1193.78
B	23.5	(4)	1414.64	53	(9)	1171.23	23.5	(4)	1253.38	100	(7)	1247.83
Totals	24	(10)	$1434.96	52	(21)	$1152.66	24	(10)	$1129.38	100	(41)	$1215.84

[1]Detail on the rating forms, procedures and analysis is available from the ESC Research & Evaluation Office.

Table 3 reveals the differences between college impact and degree program again linked to the average experience costs.

Table 3

Graduate Self-Rating Impacts By

Degree Program Areas and Average Experience Cost

Degree Program Area	High Impacts %	N	Avg. Cost	Medium Impact %	N	Avg. Cost	Low Impacts %	N	Avg. Cost	Totals %	N	Avg. Cost
1	0	(0)	-0-	50	(6)	$1048.34	50	(6)	$1143.00	100	(12)	$1095.67
2	46	(6)	$1467.54	39	(5)	1216.92	15	(2)	1241.45	100	(13)	1336.37
3	25	(4)	1386.08	63	(10)	1183.13	12	(2)	976.44	100	(16)	1208.03
Totals	24	(10)	$1434.96	52	(21)	$1152.67	24	(10)	$1129.38	100	(41)	$1215.84

While incomplete by themselves, the three tables immediately raise many important and interesting questions. Among them are:

1. Why is the average cost of the student experience higher -- on an overall basis -- in type "B" facilities rather than at type "A" facilites?
2. Why is the average cost of "high impact" student experience higher at "A" facilities, especially in view of the higher overall experience costs in "B" facilities?
3. What causes the experience cost associated with the degree program area #2 to be higner in each category of impact than the other degree programs?
4. What part did different learning modes play in raising or lowering costs?
5. Did the prior experience credit given the student play an important part in establishing costs?
6. Were there faculty load variations between locations which had an effect on cost?

The list presented here is indicative of the almost endless array of meaningful questions that could be raised.

With data tabulated in the individual student contract format of the model, analysis necessary to answer questions raised becomes a relatively simple matter of data organization. For example, we might ask: Why is the "high impact" average student experience more costly at the "A" facilities than in the "B" locations?

A study of the student contracts indicates that the only variations between students are the length of experience, location of experience, degree program and use of tutors. Therefore an analysis of these variations caused by location, length of experience and tutor use was prepared. (Appendix B). Among the information contained in this analysis is the standardized costs by contract month which will be assigned to every student regardless of degree program at each location.

In addition data was developed (Table 4) to show the Graduate's Self-Rating Impacts related to degree programs and type of facility including tutor cost variations.

Table 4

Graduate Self-Rating Impacts By Type of Facility and Degree Program Including Average Length of Experience and Average Tutor Cost

Type of Learning Facility	#1				#2				#3				Total			
	N	%	Avg. Months	Avg. Tutor Cost	N	%	Avg. Months	Avg. Tutor Cost	N	%	Avg. Months	Avg. Tutor Cost	N	%	Avg. Months	Avg. Tutor Cost
High Impact																
A			None		1	(25)	6.00	-0-	5	(83)	8.80	$80.00	6	(60)	8.33	$66.67
B			None		3	(75)	7.83	$166.33	1	(17)	6.00	100.00	4	(40)	7.38	149.75
Total					4	(100)	7.38	$124.75	6	(100)	8.33	$83.33	10	(100)	7.95	$99.90
Medium Impact																
A	4	(67)	6.25	$22.50	6	(60)	6.75	$43.08	2	(40)	8.00	$20.00	12	(57)	6.79	$32.38
B	2	(33)	6.00	10.00	4	(40)	6.50	136.25	3	(60)	6.33	66.67	9	(43)	6.33	85.00
Total	6	(100)	6.17	$18.33	10	(100)	6.65	$80.35	5	(100)	7.00	$48.00	21	(100)	6.60	$54.93
Low Impact																
A	3	(50)	6.50	-0-	2	(100)	6.00	-0-	1	(50)	6.00	-0-	6	(60)	6.25	-0-
B	3	(50)	6.00	$160.00			None		1	(50)	7.50	$160.00	4	(40)	6.38	$160.00
Total	6	(100)	6.25	$80.00	2	(100)	6.00	-0-	2	(100)	6.75	$80.00	10	(100)	6.30	$64.00
Summary																
A	7	(58)	6.38	$12.85	9	(56)	6.50	$28.72	8	(62)	8.25	$55.00	24	(59)	7.04	$32.85
B	5	(42)	6.00	100.00	7	(44)	7.07	149.14	5	(38)	6.50	92.00	17	(41)	6.59	117.88
Total	12	(100)	6.21	$49.16	16	(100)	6.75	$31.40	13	(100)	7.58	$69.23	41	(100)	6.85	$68.11

Our original hypothesis was that "high impact" students would be more costly because they made greater use of tutors and engaged in a longer contract experience. They hypothesis was correct. Overall the high impact students took, an average of 1.35 months more work than medium impact and 1.65 months more than low impact. Further, all high impact students used an average of $44.97 of tutor services more than medium impact students and $35.90 more than low impact. However, the high impact students at "A" locations, while taking almost 1 more month of work (.95) than those at "B" facilities, used substantially less (an average of $83.09) tutor services than did those at "B" locations.

As the answer is not as simple as more experience time and tutor use the average contract month cost -- $169.45 at "A" locations, $189.40 in "B" facilities (Appendix B) was applied to the average months shown in table 5. This produced costs of $1411.51 at "A" locations and $1397.77 at "B" facilities. While these figures are fairly close to those shown on table 2, they vary enough to require explanation.

Therefore, we analyzed each of the high impact students contracts and related them to the actual facility and cost (Table 5).

Table 5

High Impact Graduate, Self-Rating By Acutual Facility and Cost

Facility	Number Students	Number Contract Months	Avg. Contract Months	X Standard[1] Contract/ Month Costs	= Standard Average Cost	+ Tutor Cost	Total Average Cost
"A" Locations							
A-1	1	8	8	$162.74	$1301.92		$1301.92
A-2	3	22	7.33	161.62	1186.87	$40.00	1226.87
A-3	1	6	6	169.14	1014.84		1014.84
A-4	1	14	14	172.76	2418.64	280.00	2698.64
Total	6	50	8.33	$165.82	$1381.84	$66.67	$1448.51
"B" Locations	4	29.5	7.38	$171.51	$1264.89	$149.75	$1414.64

[1]See Appendix B.

This method of analysis has developed the same cost figures as shown on Table 2 and makes apparent the reason that the average experience cost of high impact students is higher at "A" locations than "B" facilities. The one student at the A-4 facility had an experience length that was 28% of the total type "A" student experience length at the highest standardized contract month cost and highest per student tutor cost.

As is found with everything that develops from this cost/effectiveness system, however, more questions are raised. For example:

1. Why is the standardized contract month cost higher at "A-4" than at the other "A" and "B" locations?
2. Was the program of this student any more effective than the programs of other students?

These questions, and the others raised will not be answered here as it is felt that enough material has been presented to give an understanding of the model and its many and varied analysis possibilities.

The Future Directions of the Cost Partner

A full scale cost/effectiveness study will soon be underway at Empire State College and will involve all aspects of the program and cost components for 500 students.

The full scale study will include those things left out of the pilot project, i.e., deferred asset treatment of developmental and access costs, in-kind contributions, expenditures made by SUNY Central on behalf of ESC, the effect of outside funding, and the assignment of standardized costs to each of the component locations of the College rather than grouping as was done with type "B" facilities.

In addition to the full scale study we will be developing computer programs for our own use as well as for the use of others.

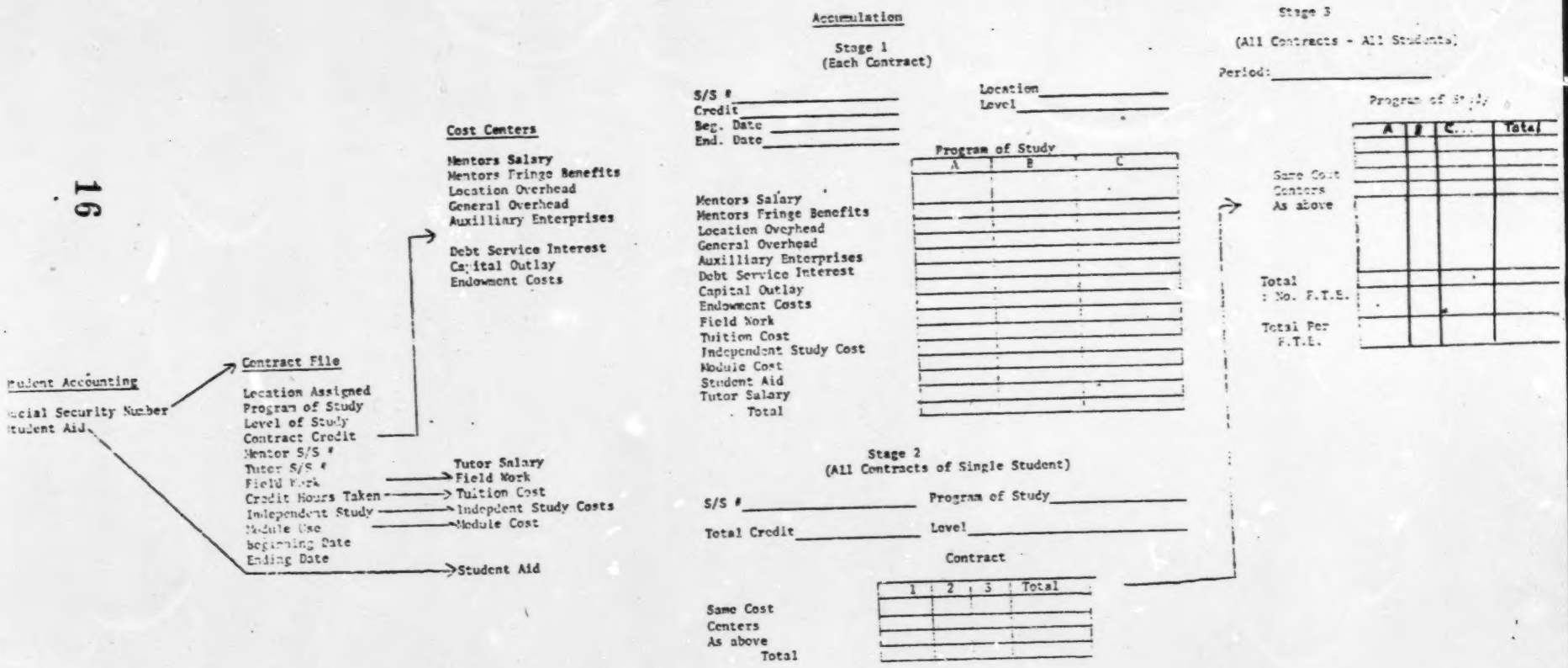
During the 1975-76 fiscal year there will be three other institutions participating in the project by adapting the ESC models, tools and techniques to their own campuses.

Efforts are now underway to develop the tools and techniques to completely fill out the model. That is, the methods and means to gather data on student's forgone earnings, additional costs incurred by students due to baby-sitters, transportation, etc., and the contribution made to society because of the ESC experience. The latter one, societal contribution, cannot be completed by the end of the FIPSE funding period due to the need for extensive longitudinal data. It will, however, be started so that collection of longitudinal data may begin.

Not much work has been done as yet in the area of reporting vehicles as the development depends upon the data available, the information that the recipients feel a need for, and the information that the Research Staff believes certain groups of decision makers -- the President, the ESC cabinet, other administrative offices, the faculty, students, the Legislature, State Budget Office, etc. -- need. This development will now move along with data availability.

APPENDIX A

EMPIRE STATE COLLEGE COST/EFFECTIVENESS PROGRAM COST ANALYSIS MODEL



APPENDIX B

Analysis of Costs By Different Cost Variances

	Number Students	Total FTE/Mo.	Average FTE/Mo.	Total	Average Student	Average FTE/Mo.	Standardized Contract Month Costs: Faculty/ Contract Month Cost	Location Overhead/ Contract Month Cost	General Overhead/ Contract Month Cost	Total	Total Cost	Average Student Cost	Average Contract Month Cost
Type "A" Facilities													
A-1	8	53.5	6.69	$308.50	$38.56	$5.77	$34.79	$36.85	$91.10	$162.74	$ 9015.09	$1126.89	$168.51
A-2	10	71.0	7.10	200.00	20.00	2.82	33.63	36.89	91.10	161.62	11675.02	1167.50	164.44
A-3	1	6.0	6.00	-0-	-0-	-0-	36.04	42.00	91.10	169.14	1014.84	1014.84	169.14
A-4	5	38.5	7.70	280.00	56.00	7.27	39.71	41.95	91.10	172.76	6931.26	1386.25	180.03
Total	24	169.0	7.04	$788.50	$32.85	$4.67	$36.04	$39.42	$91.10	$166.56	$28636.21	$1193.18	$169.45
Type "B" Facilities													
B-1	2	13.5	6.75	$160.00	$80.00	$11.85	see note	see note	see note	see note	$ 2475.39	$1237.70	$183.36
B-2	7	47.5	6.79	1058.00	151.14	22.27					9204.73	1314.96	193.78
B-3	2	12.0	6.00	400.00	200.00	16.67					2458.12	1229.06	204.84
B-4	6	39.0	6.50	386.00	64.33	9.90					7074.89	1179.15	181.41
Total	17	112.0	6.59	$2004.00	$117.88	$17.89	$34.42	$45.99	$91.10	$171.51	$21213.13	$1247.83	$189.40
Total All Facilities	41	281.0	6.85	$2792.50	$68.11	$9.94	$37.90	$44.04	$91.10	$173.04	$49849.34	$1215.84	$177.40

Note: At this time costs for faculty, location overhead and general overhead have not been isolated by individual location. All facilities within this classification were used to develop a type "B" standardized contract month cost which is applied to all students.